CLAIMS

1. A method for producing a plant storage organ in which a recombinant protein is highly produced, comprising the following steps (A), (B), and (C):

(A) constructing a vector which comprises a recombinant protein gene to be expressed in a plant storage organ, a cytokinin-related gene, a drug-resistant gene, and a removable DNA element, wherein the cytokinin-related gene and the drug-resistant gene exist in the positions so that they can behave together with the removable DNA element, while the recombinant protein gene to be expressed in the plant storage organ exists in the position so that it would not behave together with the removable DNA element, and introducing the vector into cells,

(B) redifferentiating transformant by culturing the plant cell into which the vector is introduced by said step (A) in a drug-supplemented medium and a drug-free medium, and

(C) obtaining the plant storage organ from the transformant redifferentiated in said step (B).

2. The method for producing a plant storage organ in which a recombinant protein is highly produced according to claim 1, wherein after culturing the vector-introduced plant cell in a medium supplemented with plant hormone and drug, it is cultured in a medium free of plant hormone and drug in the step of redifferentiating transformant from the vector introduced-plant cell.

3. The method for producing a plant storage organ in which a recombinant protein is highly produced according to claim 1 or

2, wherein the recombinant protein gene to be expressed in the plant storage organ is under control of a promoter specific to the plant storage organ.

4. The method for producing a plant storage organ in which a recombinant protein is highly produced according to any one of claims 1 to 3, wherein the recombinant protein gene to be expressed in the plant storage organ is inserted into or is substituted for the site encoding protein variable region, in the protein gene originally expressed in the plant storage organ.

5. The method for producing a plant storage organ in which a recombinant protein is highly produced according to claim 4, wherein a DNA sequence which encodes an amino acid sequence for enzyme cleavage to cleave and separate the recombinant protein from the protein originally expressed in the plant storage organ is placed into the boundary between the recombinant protein gene and the protein gene originally expressed in the plant storage organ.

6. The method for producing a plant storage organ in which a recombinant protein is highly produced according to any one of claims 1 to 5, wherein the plant storage organ is a seed.

7. The method for producing a plant storage organ in which recombinant protein is highly produced according to claim 6, wherein the gene originally expressed in the plant storage organ in which the recombinant protein gene to be expressed in the plant storage organ is inserted into or is substituted for the protein variable region, is a seed storage protein gene.

8. The method for producing a plant storage organ in which a recombinant protein is highly produced according to any one of claims 1 to 7, wherein the cytokinin-related gene is a cytokinin-synthesis gene.

9. The method for producing a plant storage organ in which a recombinant protein is highly produced according to claim 8, wherein the cytokinin-synthesis gene is an isopentenyl transferase gene.

10. The method for producing a plant storage organ in which a recombinant protein is highly produced according to any one of claims 1 to 9, wherein the drug-resistant gene is a hygromycin-resistant gene.

11. The method for producing a plant storage organ in which a recombinant protein is highly produced according to any one of claims 1 to 10, wherein the removable DNA element is derived from a site-specific recombination system or a transposon.

12. The method for producing a plant storage organ in which a recombinant protein is highly produced according to any one of claims 1 to 11, wherein the recombinant protein gene to be expressed in the plant storage organ is a GLP-1 (7-36) gene or a gene encoding a peptide comprising a sequence in which one or a few amino acids are deleted, substituted and/or added in the amino acid sequence of the GLP-1 (7-36) and having a GLP-1 activity.

13. The method for producing a plant storage organ in which a recombinant protein is highly produced according to any one of claims 1 to 11, wherein the recombinant protein gene to be expressed in the plant storage organ is a gene encoding the GLP-1 derivative in which glutamine and asparagine or asparatic acid, respectively, are substituted at the 26^{th} and 34^{th} positions in a peptide comprising GLP-1 (7-36) or its sequence in which one or a few amino acids are deleted, substituted and/or added, and having a GLP-1 activity.

14. The method for producing a plant storage organ in which a recombinant protein is highly produced according to claim 12 or 13, wherein the recombinant protein gene to be expressed in the plant storage organ is a gene encoding the GLP-1 derivative in which serine or glycine is substituted at the 8^{th} position in the amino acid sequence.

15. The method for producing a plant storage organ in which a recombinant protein is highly produced according to claim 14, wherein the recombinant protein gene to be expressed in the plant storage organ is a gene shown in SEQ ID NO: 1 in the sequence listing.

16. The method for producing a plant storage organ in which a recombinant protein is highly produced according to any one of claims 1 to 15, wherein the plant is monocotyledon.

17. The method for producing a plant storage organ in which a recombinant protein is highly produced according to claim 16, wherein the monocotyledon is Oryza sativa.

18. A plant storage organ in which a recombinant protein is highly produced by the method for producing according to any one of the claims 1 to 17, or a transformed plant to produce the plant storage organ.

19. A GLP-1 derivative having an amino acid sequence in which glutamine is substituted at the 26^{th} position and asparagine or asparatic acid is substituted at the 34^{th} position in a peptide comprising a GLP-1 (7-36) or its sequence in which one or a few amino acids are deleted, substituted and/or added in the amino acid sequence, and having a GLP-1 activity.

20. The GLP-1 derivative according to claim 19, wherein the peptide comprising the GLP-1 (7-36) or its sequence in which one or a few amino acids are deleted, substituted and/or added in the amino acid sequence, and having GLP-1 activity is GLP-1 (7-36), GLP-1 (7-37), or a C-terminal amide of GLP-1 (7-36) or GLP-1 (7-37).

21. The GLP-1 derivative according to claim 19 or 20, wherein serine or glycine is substituted at the 8^{th} position in the amino acid sequence.

22. A GLP-1 derivative having an amino acid sequence shown in SEQ ID NO: 2, 5, or 6 in the sequence listing.